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Sep 25 10 20 AM '97

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23 September, 1997

Mr. John Hall, Town Manager
Town of St. Johnsbury
34 Main Street
St. Johnsbury, VT 05863

RE: Initial Site Investigation Report,
St. Johnsbury Town Garage

Dear Mr. Hall,

Enclosed is one bound copy of the Initial Site Investigation Report for St. Johnsbury Town Garage, located in St. Johnsbury, Vermont.

Please contact me or Ron Miller, Regional Manager, if you have any questions or comments regarding this report.

Sincerely,

Bruce Hamilton
Environmental Engineer

enclosure

cc. Chuck Schwer

Ref: 97053c01



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INITIAL SITE INVESTIGATION REPORT

ST. JOHNSBURY TOWN GARAGE

SMS Site #97-2178

Almshouse Road

St. Johnsbury, VT

23 September, 1997

Prepared for:

Town of St. Johnsbury

34 Main Street

St. Johnsbury, VT 05863

Contact: Mr. John Hall, Town Manager

Phone: 802-748-3926

Prepared by:

Marin Environmental, Inc.

Ground Water of Vermont

1700 Hegeman Avenue

Colchester, VT 05446

Contact: Bruce Hamilton

Phone: 802-655-0011

MARIN Project #: V97-053
MARIN Document #: 97053R01.DOC

SEP 25 10 20 AM '97

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EXECUTIVE SUMMARY

The Ground Water of Vermont division of Marin Environmental, Inc. (MARIN) has conducted an initial site investigation at the St. Johnsbury Town Garage located on Almshouse Road, St. Johnsbury, VT and has concluded the following:

- Petroleum releases from former underground storage tank (UST) systems at the site appear to have resulted in a minor impact to ground water in the vicinity of the former UST systems. Xylenes were detected at a level above the Vermont Groundwater Enforcement Standards (VGES) in a ground-water sample collected from a monitoring well located in the former UST excavation. No VGES exceedances were detected in any of three downgradient monitoring wells.
- Observations made during the UST closure and the ground-water sample results suggest that residual contamination is limited to the immediate vicinity of the former USTs.
- The residual subsurface contamination at the site does not appear to pose a threat to any nearby sensitive receptors.
- No drinking-water supplies appear to be at risk from the residual contamination at the site.
- Surficial materials at the site consist mainly of coarse sand and gravel underlain by hard pan. On 8 August 1997, the water table was found to be about 7 to 11 feet below ground surface, and exhibited a southeasterly trending gradient of about 7.5 percent.

On the basis of the results of this investigation, MARIN makes the following recommendations:

1. The four on-site monitoring wells should be resampled in November 1997 to confirm the August 1997 analytical results. The samples should be analyzed for petroleum compounds by EPA Method 8020 and total petroleum hydrocarbons (TPH) by modified EPA Method 8100.
2. If the subsequent ground-water analytical results demonstrate no exceedance of VGESs, MARIN recommends that the site be considered for "Site Management Activities Completed" (SMAC) status by the Vermont Department of Environmental Conservation (VT DEC).

1.0 INTRODUCTION

This report details the results of an initial site investigation conducted at the St. Johnsbury Town Garage located on Almshouse Road in the town of St. Johnsbury, Vermont (Figure 1). This report has been prepared by the Ground Water of Vermont division of Marin Environmental, Inc. (MARIN) under the direction of John Hall, the St. Johnsbury Town Manager. The site investigation was initiated with Vermont Department of Environmental Conservation (VT DEC) approval following the discovery of subsurface petroleum contamination during the removal of two underground storage tanks (USTs) on 21 April 1997.

1.1 Site Location and Physical Setting

The maintenance facility includes a three-bay automotive and equipment-service garage, a multi-bay service and supply area with offices, and several exterior storage structures. The site is located at the northern edge of a generally flat area, along the base of a steep embankment. Approximately 150 feet south of the site, the land surface drops steeply to the Moose River. The diesel USTs and pump island were located along the northern edge of the property, between the two main maintenance garages at the edge of the parking area (see Figure 2, Appendix A).

The Moose River, a tributary of the Passumpsic River, is located approximately 150 feet south of the garage. The site and all nearby residences (the closest being located across the river to the south) are served by the St. Johnsbury municipal drinking-water supply system. The ground surface around the maintenance building has an average elevation of about 597 feet above mean sea level and slopes toward the south. The presumed direction of ground-water flow in the area is toward the south in the direction of the Moose River.

1.2 Site History

On 21 April 1997, evidence of a petroleum release from two in-service diesel underground storage tanks (USTs) was detected when the tanks were removed. Holes were observed in both USTs. Deeper soils beneath one of the tanks exhibited distinctive petroleum odors indicative of previous gasoline contamination. Ground water was observed beneath the tank location at a depth of approximately six feet below ground surface. A petroleum sheen was noted in the tank excavations.

Soil screening with a portable photoionization detector (PID) also indicated that elevated contaminant concentrations were present in the vicinity of the USTs. PID readings of soil samples collected from these areas ranged from 1.2 to 1,269 parts per million (ppm), and averaged approximately 164 ppm. VT DEC guidance documents state that PID readings of more than 10 ppm for diesel-contaminated soils are considered indicative of significant contamination that will require further investigation.

Excavation of all contamination was not considered feasible due to several factors, including the inability to determine the lateral and vertical extent of contamination present, the presence of contamination at ground water and limitations of the on-site excavating equipment. As a result, all excavated soils were returned to the excavation, in accordance with VT DEC guidance documents. At the time of backfilling, a single ground-water monitoring well was installed in the excavation.

MARIN initiated an initial site investigation under the VT DEC "Expressway" process after receiving approval on 4 July 1997 from Mr. John Hall, the St. Johnsbury Town Manager, and the VT DEC.

1.3 Objectives and Scope of Work

The objectives of this initial site investigation were to:

- Evaluate the degree and extent of petroleum contamination in soil and ground water;
- Qualitatively assess the risks to environmental and public health via relevant sensitive receptors and potential contaminant migration pathways; and
- Identify potentially appropriate monitoring and/or remedial actions based on the site conditions.

To accomplish these purposes, MARIN has:

- Supervised the installation of three additional soil borings/monitoring wells, and determined the extent of petroleum contamination, and the local ground-water flow direction.
- Screened subsurface soils from the soil borings for the possible presence of volatile organic compounds (VOCs) using a photoionization detector (PID).
- Collected and submitted ground-water samples from the four on-site monitoring wells for laboratory analysis of volatile petroleum compounds and total petroleum hydrocarbons.
- Identified sensitive receptors in the area, and assessed the risk posed by the contamination to these potential receptors.
- Evaluated the need for treatment and/or a long-term monitoring plan for the site.
- Prepared this summary report, which details the work performed, qualitatively assesses risks, provides conclusions and offers recommendations for further action.

2.0 INVESTIGATIVE PROCEDURES AND RESULTS

2.1 Soil Boring / Monitoring Well Installation

On 21 July 1997, MARIN supervised the installation of one monitoring well (MW-2). The monitoring well was installed by Adams Engineering of Underhill, Vermont using vibratory drilling techniques to both advance the boring and emplace the well. The vibratory drilling rig was not able to penetrate through large cobbles encountered at several locations, so two additional monitoring wells (MW-3 and MW-4) were installed on 29 July 1997 by Tri-State

Drilling and Boring of West Burke, Vermont using hollow-stem-auger (HSA) drilling techniques. The wells were placed in areas presumed to be hydraulically downgradient and cross-gradient from the former USTs as suggested by surrounding surface topography and waterway locations. The steep slope immediately north of the former USTs prevented access by a drilling rig to install an upgradient monitoring well. Approximate monitoring well locations are shown on Figure 2.

The soils encountered in each boring generally consisted of gray coarse sand and gravel, with occasional brown medium-fine sands. Borings were completed to approximately 15 feet below ground surface (bgs). Ground water was encountered at depth of 10-11 feet bgs at the time of drilling. At the boring advanced using vibratory drilling, continuous soil samples were collected using a five-foot polyethylene-lined core barrel with a 2.375-inch inner diameter. The core barrel, which also served as the drill bit with an outer diameter of 4.0 inches, was simultaneously pushed and vibrated into place to advance the boring. At borings advanced using HSA techniques, soil samples were collected at five-foot intervals using a standard split-spoon barrel. Soil recovery was generally fair, ranging between 25 and 60 percent. The soil samples were screened for the possible presence of VOCs with a photoionization detector (PID) and logged for lithology by a MARIN engineer. All downhole drilling and sampling equipment was decontaminated during use as appropriate.

A monitoring well was installed in soil boring MW-2 by vibrating a 1.5-inch diameter PVC well point into the open hole left by the core barrel. A 10 foot section of 0.010-inch slot high-flow screen was placed such that approximately five feet of screen extended above the apparent water table. Solid 1.5-inch diameter PVC riser extended from the top of screen to approximately 0.5 feet below ground surface.

Monitoring wells MW-3 and MW-4 were constructed using hollow-stem auger drilling techniques employing two-inch screen and risers. Clean quartz #1 filter sand was placed in the annulus around the well to at least one foot above the top of the screened interval. A bentonite pellet seal, approximately 1.0 feet thick, was set above the sand pack and the remainder of the annular space was backfilled with native material. Each completed monitoring well was protected by a flush-mounted steel roadbox cemented into place. Each well casing was topped with a water-tight compression cap. None of the monitoring wells were developed after installation. Monitoring-well construction details are included on the soil-boring and well-construction logs in Appendix A.

2.2 Soil-Screening Results

PID readings in soil samples collected from the borings ranged from 0.0 to 3.1 ppm. The highest PID reading was obtained at MW-2 at a depth of approximately five feet below ground surface (bgs). PID screening results are included on the boring logs in Appendix A.

MARIN field personnel screened soil samples from each soil boring for the possible presence of volatile organic compounds (VOCs) using a Photovac Model 580B portable photoionization detector (PID). The PID was calibrated with an isobutylene standard gas to a benzene reference.

2.3 Determination of Ground-Water Flow Direction and Gradient

Ground water in the unconfined surficial aquifer directly beneath the site appears to be flowing in a southeasterly direction, toward the Moose River. The average gradient of the local ground-water table on 8 August 1997 was about 7.5 percent. Water-level measurements and elevation calculations for 8 August 1997 are presented in Table 1. The ground-water contour map in Figure 3 was prepared using this data.

TABLE 1. Ground-Water Elevation Data

Well I. D.	Top of Casing Elevation *	Depth to Water (feet, TOC)	Ground Water Elevation
MW-1	100.00	7.05	92.95
MW-2	99.02	10.81	88.21
MW-3	98.64	8.88	89.76
MW-4	99.96	9.65	90.31

*Top of casing (TOC) and ground water elevations are relative to an arbitrary site datum of 100.00 feet

Fluid levels were measured in the four monitoring wells on 8 August 1997. The depth to water varied from 7.05 feet (MW-1) to 10.81 feet (MW-2) below top-of-casing. No free-phase petroleum was observed in any of the on-site monitoring wells. Static water-table elevations were computed for each monitoring well by subtracting the measured depth-to-water readings from the surveyed top-of-casing elevations, which are relative to an arbitrary site datum of 100.00 feet.

The shallow aquifer at the site consists mainly of gray coarse sand and gravel, with occasional brown medium-to-fine sands. These soil characteristics typically exhibit effective porosities of about 0.2 to 0.35 and hydraulic conductivities of about 3 to 300 ft/day (Fetter, 1994). Assuming Darcian flow, these estimated ranges of porosity and conductivity combine with the calculated ground-water gradient of 7.5 percent to yield an estimated range of ground-water flow velocities in the surficial aquifer of between 0.6 and 112 ft/day.

2.4 Ground-Water Sampling and Analysis

Review of the ground-water analytical results indicates that with the exception of total xylene levels detected in MW-1 (the source area) the Vermont Groundwater Enforcement Standards (VGESs) for benzene, toluene, ethylbenzene, xylenes (collectively referred to as BTEX) were not exceeded in any of the ground water samples collected on-site. The samples collected from MW-1 contained ethylbenzene, 369 ppb (parts per billion) as well as toluene and total xylenes at 522 ppb and 2,930 ppb, respectively. Methyl-tertiary-butyl ether (an octane-boosting gasoline additive employed after 1980) was detected in MW-3 and MW-4 at levels below the Vermont Health Advisory. Total petroleum hydrocarbons (TPH) were detected in

MW-1 and duplicate samples at levels of 6.57 ppm (parts per million) and 4.12 ppm respectively. Ground-water analytical results are summarized below in Table 2; the contaminant distribution is shown on Figure 4. Laboratory report forms are included in Appendix B.

**TABLE 2. Ground-Water Analytical Results
January/May 1997**

Well I.D.	Benzene	Ethyl benzene	Toluene	Xylenes	MTBE	TPH
MW-1	ND <20	369	522	2,930	ND <20	6.57 ppm
MW-2	ND <1	ND <1	ND <1	ND <1	ND <1	ND <0.8 ppm
MW-3	ND <1	ND <1	ND <1	ND <1	4.0	ND <0.8 ppm
MW-4	ND <1	ND <1	ND <1	ND <1	16.2	ND <0.8 ppm
Duplicate (MW-1)	ND <50	361	527	3,030	ND <50	4.12 ppm
Trip Blank	ND <1	ND <1	ND <1	ND <1	ND <1	ND <0.8 ppm
VGES*	5	680	2,420	400	40	---

Results reported as parts per billion (ppb), unless noted otherwise.

ND = Compound not detected above indicated detection limit.

TBQ = Compound detected at trace levels below quantitation limit indicated.

VGES = Vermont Groundwater Enforcement Standard, * Vermont Health Advisory for MTBE.

Shaded area denoted exceedance of VGES.

Ground-water samples were collected from the four monitoring wells on 8 August 1997. Each monitoring well was purged and then sampled using the dedicated bailer and dropline. Purge water was discharged directly to the ground in the vicinity of each well. A trip blank and a duplicate sample were collected during the August sampling for quality assurance/quality control (QA/QC) purposes. All field procedures were conducted in accordance with MARIN standard protocols.

The ground-water samples were submitted to Endyne, Inc. of Williston, Vermont, where they were analyzed for the possible presence of benzene, toluene, ethylbenzene, xylenes (BTEX) and methyl-tertiary butyl ether (MTBE) by EPA Method 8020 and total petroleum hydrocarbons (TPH) by modified EPA Method 8100. Analytical results from the QA/QC samples indicate that adequate QA/QC was maintained during sample collection and analysis. No petroleum compounds were detected in the trip blank, and analytical results for the duplicate sample (MW-1) were within 2.5% for total BTEX and within 37 percent for TPH.

3.0 SENSITIVE RECEPTOR SURVEY AND RISK ASSESSMENT

3.1 Sensitive Receptor Survey

MARIN conducted a survey to identify sensitive receptors in the vicinity of St. Johnsbury Town Garage that could potentially be impacted by residual soil and ground-water contamination. The following sensitive receptors were identified in the vicinity of the site:

- The on-site maintenance buildings (constructed using slab-on-grade design) located approximately 75 to 100 feet east and west of the former USTs and pump island.
- The Moose River, located approximately 150 feet south of the former tanks.

3.2 Risk Assessment

MARIN assessed the risks that the residual subsurface contamination poses to the receptors identified above. In general, human exposure to petroleum related contamination is possible through inhalation, ingestion, or direct contact while impacts to environmental receptors are due either to a direct release or contaminant migration through one receptor to another or along a preferential pathway.

The findings of our risk assessment indicate that the residual subsurface petroleum contamination at the site does not appear to pose a significant threat to any nearby sensitive receptors. Observations made during the UST closure and recent ground-water sample results from monitoring wells completed in and downgradient of the former USTs suggest that residual contamination is limited to the immediate vicinity of the former USTs. Current information suggests that no significant ground-water contamination has migrated to the Moose River.

- The on-site building and all nearby dwellings are served by the municipal water system. St. Johnsbury's water supply is obtained from the Stiles Pond Reservoir, which is located approximately three miles east of the site and is thus unlikely to be threatened by the contamination detected at the site.
- Ground-water data at the site suggest that the area of ground-water contamination is limited to the immediate area of the former UST location and does not extend beneath the existing on-site structures. Furthermore, the slab-on-grade construction of these buildings further reduces the threat of vapor entry. No elevated PID readings were observed in portions of the building maintenance areas during a 29 July 1997 screening.
- Several off-site residences are located south and downgradient of the on-site buildings. All of these buildings are located at least 400 to 500 feet from the probable source areas, on the other side of the Moose River, so the likelihood of vapor impact to these buildings is low.
- A site walkthrough revealed no evidence of ground-water seeps along the Moose River embankment or grass exposures.
- The Moose River, located 150 feet south of the site, is the nearest downgradient surface-water body. Although the Moose River likely represents the eventual surface

discharge point of the ground water flowing beneath the site, ground-water analytical data suggests that contamination does not extend beyond the immediate source area. In addition, the natural processes of dilution, dispersion and biodegradation will likely prevent the discharge of detectable levels of petroleum compounds to this river.

- PID soil screening data from the UST excavations and monitoring-well borings suggest that the area of significant soil contamination is limited to the immediate vicinity of the former UST and pump island locations. This area is surfaced with concrete or asphalt, which limits the potential for direct public exposure to contaminated soils.

4.0 CONCLUSIONS

Based on the results of the site investigation described above, MARIN concludes the following:

1. Petroleum releases from former underground storage tank (UST) systems at the site appear to have resulted in a minor impact to ground water in the vicinity of the former UST systems. Xylenes were detected at a level above the Vermont Groundwater Enforcement Standards (VGES) in a ground-water sample collected from a monitoring well located in the former UST excavation. No VGES exceedances were detected in any of three downgradient monitoring wells.
2. Observations made during the UST closure and the ground-water sample results suggest that residual contamination is limited to the immediate vicinity of the former USTs.
3. The residual subsurface contamination at the site does not appear to pose a threat to any nearby sensitive receptors.
4. No drinking-water supplies appear to be at risk from the residual contamination at the site.
5. Surficial materials at the site consist mainly of coarse sand and gravel underlain by hard pan. On 8 August 1997, the water table was found to be about 7 to 11 feet below ground surface, and exhibited a southeasterly trending gradient of about 7.5 percent.

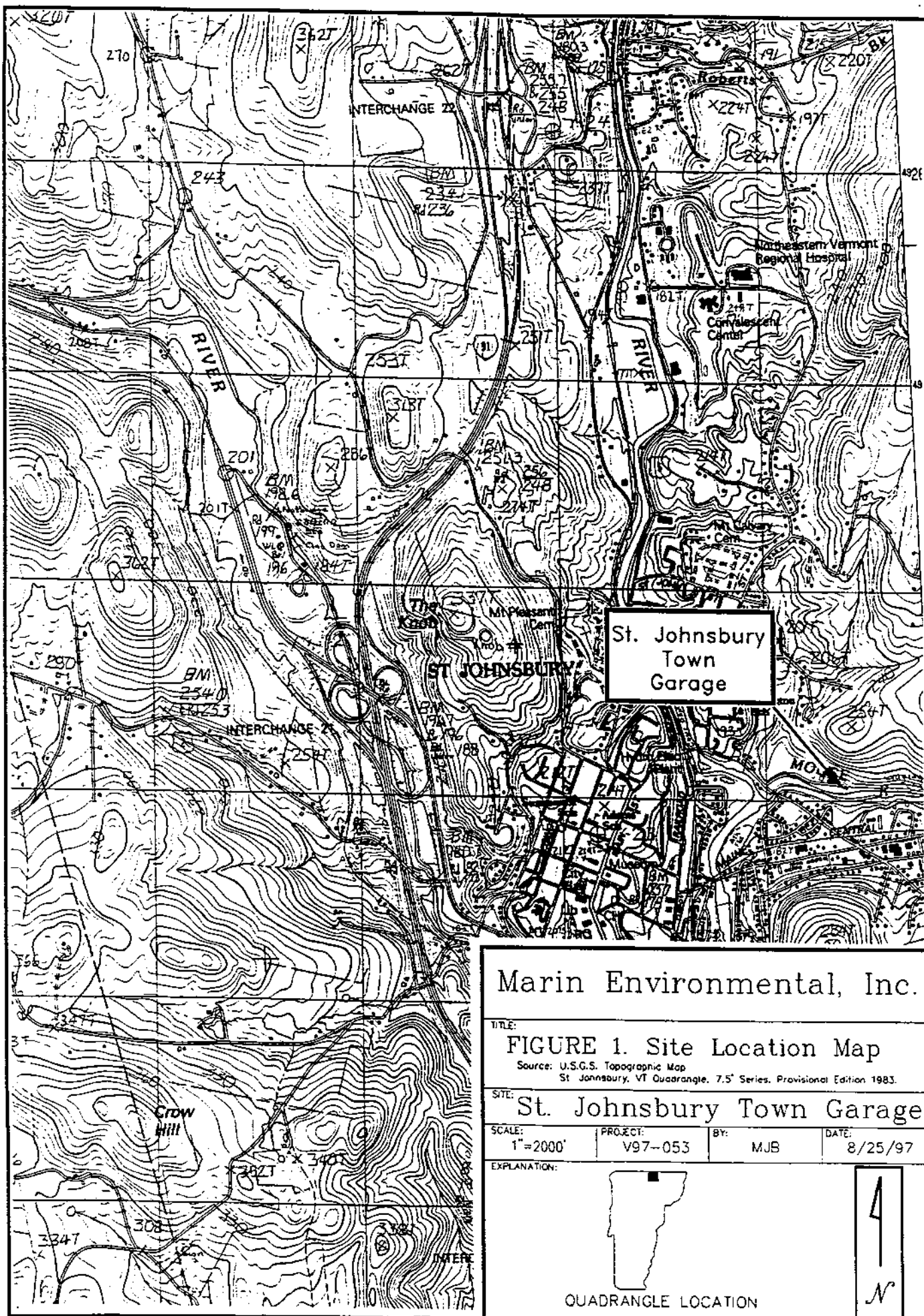
5.0 RECOMMENDATIONS

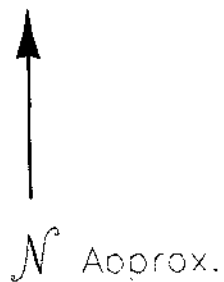
On the basis of the results of this investigation and the conclusions stated above, MARIN recommends the following:

1. The four on-site monitoring wells should be resampled in November 1997 to confirm the August 1997 analytical results. The samples should be analyzed for petroleum compounds by EPA Method 8020 and total petroleum hydrocarbons (TPH) by modified EPA Method 8100.
2. If the subsequent ground-water analytical results demonstrate no exceedance of VGESs, MARIN recommends that the site be considered for "Site Management Activities Completed" (SMAC) status by the Vermont Department of Environmental Conservation (VT DEC).

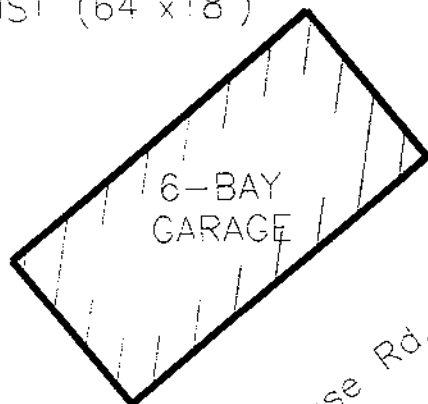
6.0 REFERENCES

- Doll, C.G. and others, 1961. *Geologic Map of Vermont*, Office of the State Geologist.
- Fetter, C.W., 1994. *Applied Hydrogeology, 3rd Ed.*, Prentice Hall, Englewood Cliffs, New Jersey, 691 p.
- USGS, 1983. St. Johnsbury, VT Quadrangle . U.S. Geological Survey. 7.5x15 minute series (topographic). Provisional Edition, 1983.





Former 3k diesel
UST (64"x18')



To Almshouse Rd.

Toe of Bank

MW-1

MW-4

MW-2

MW-3

Former 2k
diesel UST
(64"x12')

3-BAY
MAINTENANCE
GARAGE

Pump Island

Parking / Service Area

TOB

Moose River



Marin Environmental, Inc.

1 Mill St., Box C-5
Burlington, VT 05401
(802) 860-6065

ST. JOHNSBURY TOWN GARAGE
ST. JOHNSBURY, VT

FIGURE 2.
SITE MAP

With Approx. Well Locations

LEGEND:

● Monitoring Well

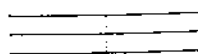
DRAWN BY: MJB

DATE: AUG 97

APPROVED BY: RM/BH

FILE No.: 97053

0 60'



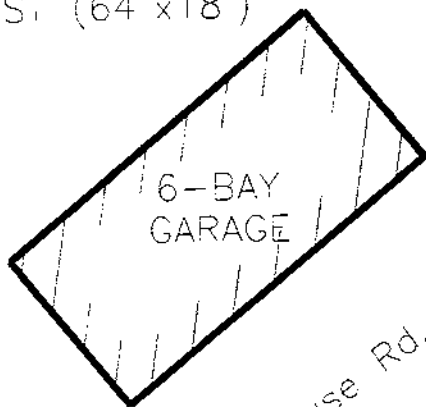
SCALE

ALL LOCATIONS ARE APPROXIMATE



N Approx.

Former 3k diesel
UST (64"x18')



To Almshouse Rd.

Toe of Bank

MW-1
92.95
MW-4
90.31
MW-2
88.21
MW-3
89.76

Former 2k
diesel UST
(64"x12')

3-BAY
MAINTENANCE
GARAGE

Pump Island

Parking / Service Area

TOB

Moose River



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ST. JOHNSBURY TOWN GARAGE
ST. JOHNSBURY, VT

FIGURE 3.
GROUND-WATER CONTOUR MAP
MONITORING DATE: 08 AUG 1997

LEGEND: — Ground-Water Contour
● Monitoring Well

DRAWN BY: MJB

DATE: AUG 97

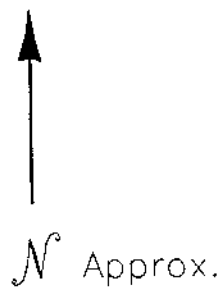
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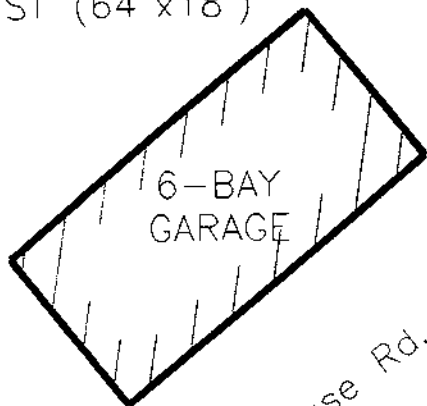


SCALE

ALL LOCATIONS ARE APPROXIMATE



Former 3k diesel
UST (64"x18')



To Almshouse Rd.

Parking / Service Area

TOB

Moose River

Toe of Bank

Former 2k
diesel UST
(64"x12')

3-BAY
MAINTENANCE
GARAGE

MW-1

3.821ppb BTEX
ND<20ppb MTBE
6.57mg TPH

MW-4

ND<1ppb BTEX
ND<1ppb MTBE
ND TPH

Pump Island

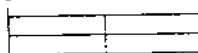
MW-2

ND<1ppb BTEX
16.2ppb MTBE
ND TPH

MW-3

ND<1ppb BTEX
4.0ppb MTBE
ND TPH

0 60'



SCALE

ALL LOCATIONS ARE APPROXIMATE



Marin Environmental, Inc.

1 Mill St., Box C-5
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ST. JOHNSBURY TOWN GARAGE
ST. JOHNSBURY, VT

FIGURE 4.
CONTAMINANT DISTRIBUTION MAP
MONITORING DATE: 08 AUG 1997

LEGEND:

Monitoring Well
ND NONE DETECTED

DRAWN BY: MJB

DATE: AUG 97

APPROVED BY: RM/BH

FILE No.: 97053

APPENDIX A

Soil Boring and Well Construction Logs

Ground Water of Vermont

FIELD SUPERVISOR B. Hamilton
CONTRACTOR
DRILLERS

JOB LOCATION
St Johnsbury Town Garage

DRILLING METHOD

installed during UST Closure

HOLOGRAPHIC DIAMETER 2"

AND	40 - 50%
SOME	10 - 40%
TRACE	0 - 10%

BORING LOCATION

Source Area
sketch on back or on-site plan
with measurements TOTAL

BORING

MW-1

TOTAL DEPTH

[illegible]

MATERIALS USED			SIZE/TYPE	QUANTITY	MATERIALS USED			SIZE/TYPE	QUANTITY
WELL SCREEN	---	---	2" PVC	10'	GROUT	---	---		
SLOT SIZE	---	---	0.011"		BACKFILL	---	---		
RISER PIPE	---	---	2" PVC	25	WATER USED	---	---		
GRADED SAND	---	---			STEAM CLEANER	---	---		
PELLET BENTONITE	---	---							
GRANULAR BENTONITE	---	---							



Ground Water of Vermont

FIELD SUPERVISOR J. Gonyaw
CONTRACTOR Adams Engineering
DRILLERS J. Adams

JOB LOCATION
St. Johnsbury Town Garage
DATE 7/21/97

DRILLING METHOD						BORING LOCATION			BORING #				
vibratory						sketch on back or on site plan			MW-2				
BORING DIAMETER 1.5'						AND 40 - 50%			TOTAL DEPTH 15'				
SOME 10 - 40%						TRACE 0 - 10%							
DEPTH	SAMPLES	SAMPLE NUMBER	BLOWS PER 6"				REC.	SAMPLE DESCRIPTION	STRAT CHG	GENERAL DESCRIPTION	WELL DETAIL	DEPTH	
			0	6	12	18	24						
								3.0	light gray, fine sand + gravel		dry, no odor 0.6 ppm		
									light brown silty sand		2.2 ppm		
5'									gray, silty sand		3.1 ppm		5'
								2.5	SAME		0.0 ppm		
									SAME		0.0 ppm		
10'									gray-brown sand + gravel	✓	0.0 ppm		10'
								3.0	gray silty sand		0.0 ppm		
									brown silty sand				
15'									brown med sand	✓	0.3 ppm		15'
20'													20'
25'													25'
30'													30'
35'													35'
40'													40'

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN	1.5" PVC	10'	GROUT		
SLOT SIZE	0.011"		BACKFILL		
RISER PIPE	1.5" PVC	4.5'	WATER USED		
GRADED SAND			STEAM CLEANER		
PELLET BENTONITE					
GRANULAR BENTONITE					



Ground Water of Vermont

FIELD SUPERVISOR B. Hamilton
CONTRACTOR Tri-State Drilling
DRILLERS T. Faulkner

JOB LOCATION
St. Johnsbury Town Garage
DATE 7/29/97

DRILLING METHOD

HSA

BORING DIAMETER 2"

AND 40 - 50%
SOME 10 - 40%
TRACE 0 - 10%

BORING LOCATION

sketch on back or on-site plan
with measurements

BORING #

MW-3

TOTAL DEPTH

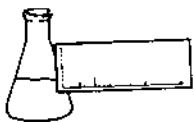
15'

DEPTH	SAMPLES SAMPLE NUMBER	BLOWS PER 6"	REG.	SAMPLE DESCRIPTION	STRAT CHG	GENERAL DESCRIPTION	WELL DETAIL	DEPTH
		0 6 12 18 24						
5'								5'
			1.0	dark brown med sand & gravel fractured cobbles		dry, no odor 0.0 ppm		
10'			1.0	Same, Num. cobbles		wet, no odor 0.0 ppm		10'
15'			0.5	sm. cobbles dark gray hardpan		↓ 0.0 ppm		15'
20'								20'
25'								25'
30'								30'
35'								35'
40'								40'

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN	2" PVC	10'	GROUT		
SLOT SIZE	0.011"		BACKFILL		
RISER PIPE	2" PVC	4.5'	WATER USED		
GRADED SAND			STEAM CLEANER		
PELLET BENTONITE					
GRANULAR BENTONITE					

APPENDIX B

Laboratory Report Forms



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: Marin Environmental
PROJECT NAME: St. Johnsbury
REPORT DATE: August 19, 1997
DATE SAMPLED: August 8, 1997

PROJECT CODE: GWVT1835
REF.#: 107,962 - 107,967

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated sample preservation with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

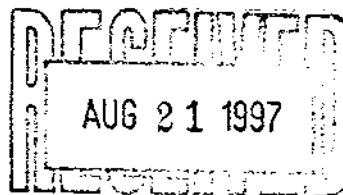
Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

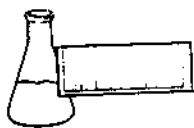
Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures



**ENDYNE, INC.****Laboratory Services**

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

EPA METHOD 602--PURGEABLE AROMATICS

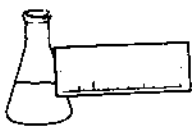
CLIENT: Marin Environmental
PROJECT NAME: St. Johnsbury
CLIENT PROJ. #: V97053

DATE RECEIVED: August 13, 1997
REPORT DATE: August 19, 1997
PROJECT CODE: GWVT1835

Ref. #:	107,962	107,963	107,964	107,965	107,966
Site:	MW-1	MW-4	MW-3	MW-2	Duplicate
Date Sampled:	8/8/97	8/8/97	8/8/97	8/8/97	8/8/97
Time Sampled:	10:00	9:10	9:45	8:55	NI
Sampler:	J. Gonyaw	J. Gonyaw	J. Gonyaw	J. Gonyaw	J. Gonyaw
Date Analyzed:	8/18/97	8/18/97	8/18/97	8/18/97	8/19/97
UIP Count:	>10	0	0	0	>10
Dil. Factor (%):	5	100	100	100	2
Surr % Rec. (%):	117	113	113	110	100
Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)
Benzene	<20	<1	<1	<1	<50
Chlorobenzene	<20	<1	<1	<1	<50
1,2-Dichlorobenzene	<20	<1	<1	<1	<50
1,3-Dichlorobenzene	<20	<1	<1	<1	<50
1,4-Dichlorobenzene	<20	<1	<1	<1	361.
Ethylbenzene	369.	<1	<1	<1	527.
Toluene	522.	<1	<1	<1	3,030.
Xylenes	2,930.	<1	<1	<1	<50
MTBE	<20	16.2	4.0	<1	

Ref. #:	107,967				
Site:	Trip Blank				
Date Sampled:	8/8/97				
Time Sampled:	8:00				
Sampler:	J. Gonyaw				
Date Analyzed:	8/18/97				
UIP Count:	0				
Dil. Factor (%):	100				
Surr % Rec. (%):	102				
Parameter	Conc. (ug/L)				
Benzene	<1				
Chlorobenzene	<1				
1,2-Dichlorobenzene	<1				
1,3-Dichlorobenzene	<1				
1,4-Dichlorobenzene	<1				
Ethylbenzene	<1				
Toluene	<1				
Xylenes	<1				
MTBE	<1				

Note: UIP = Unidentified Peaks TBQ = Trace Below Quantitation NI = Not Indicated



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Williston, Vermont 05495
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REPORT OF LABORATORY ANALYSIS

CLIENT: Marin Environmental
PROJECT NAME: St. Johnsbury
DATE REPORTED: August 28, 1997
DATE SAMPLED: August 8, 1997

PROJECT CODE: GWVT1836
REF. #: 107,968 - 107,973

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody record.

Chain of custody indicated sample preservation with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced methods and within the specified holding times.

All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced methods.

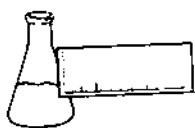
Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy were monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Reviewed by,

for
Harry B. Locker, Ph.D.
Laboratory Director

enclosures



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

TOTAL PETROLEUM HYDROCARBONS (TPH) BY MODIFIED EPA METHOD 8100

DATE: August 28, 1997
CLIENT: Marin Environmental
PROJECT: St. Johnsbury
PROJECT CODE: GWVT1836
COLLECTED BY: J. Gonyaw
DATE SAMPLED: August 8, 1997
DATE RECEIVED: August 13, 1997

Reference #	Sample ID	Concentration (mg/L) ¹
107,968	MW-1; 10:00	6.57
107,969	MW-4; 0910	ND ²
107,970	MW-3; 0945	ND
107,971	MW-2; 0855	ND
107,972	Duplicate	4.12
107,973	Trip Blank; 0800	ND

Notes:

- 1 Method detection limit is 0.8 mg/L.
- 2 None detected

CHAIN-OF-CUSTODY RECORD

22766

Project Name: **St Johnsbury**
Site Location: **Town Garage**

Reporting Address: **1700 Hegeman Ave**
Colchester, VT

Billing Address:

Sampler Name: **J. Gonyaw**
Phone #: **655-0011**

Endyne Project Number: **600VT1836**

Company: **Maurin Env.**
Contact Name/Phone #: **B. Hamilton 655-0011**

Lab #	Sample Location	Matrix	G R A B	C O M P	Date/Time	Sample Containers		Field Results/Remarks	Analysis Required	Sample Preservation	Rush
						No.	Type/Size				
187968	MW-1	H ₂ O	X		8/8/97	4	400cc		30	HCl	
187971	MW-2				0910	4	5ls				
187970	MW-3				0945	4					
187969	MW-4				0855	4					
187972	Duplicate				0800	4					
187973	Trip Blank										

Received by: Signature *[Signature]* Date/Time **8/13/97 0920**

Relinquished by: Signature *[Signature]* Date/Time **8/13/97 0940**

Received by: Signature *[Signature]* Date/Time **8/13/97 0940**

Relinquished by: Signature *[Signature]*

Requested Analyses

New York State Project: Yes <input checked="" type="checkbox"/> No <input checked="" type="checkbox"/>		TKN		Total Solids		Metals (Specify)		EPA 624		EPA 8270 B/N or Acid	
1	pH	6		11		16		21		26	
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	EPA 625 B/N or A	27	EPA 8010/8020
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	EPA 418.1	28	EPA 8080 Pest/PCB
4	Nitrite N	9	BOD ₅	14	Turbidity	19	BTEX	24	EPA 608 Pest/PCB		
5	Nitrate N	10	Alkalinity	15	Conductivity	20	EPA 601/602	25	EPA 8240		

TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)

Other (Specify): **8020+1113E & TPH by 8100**